SLICE into the future

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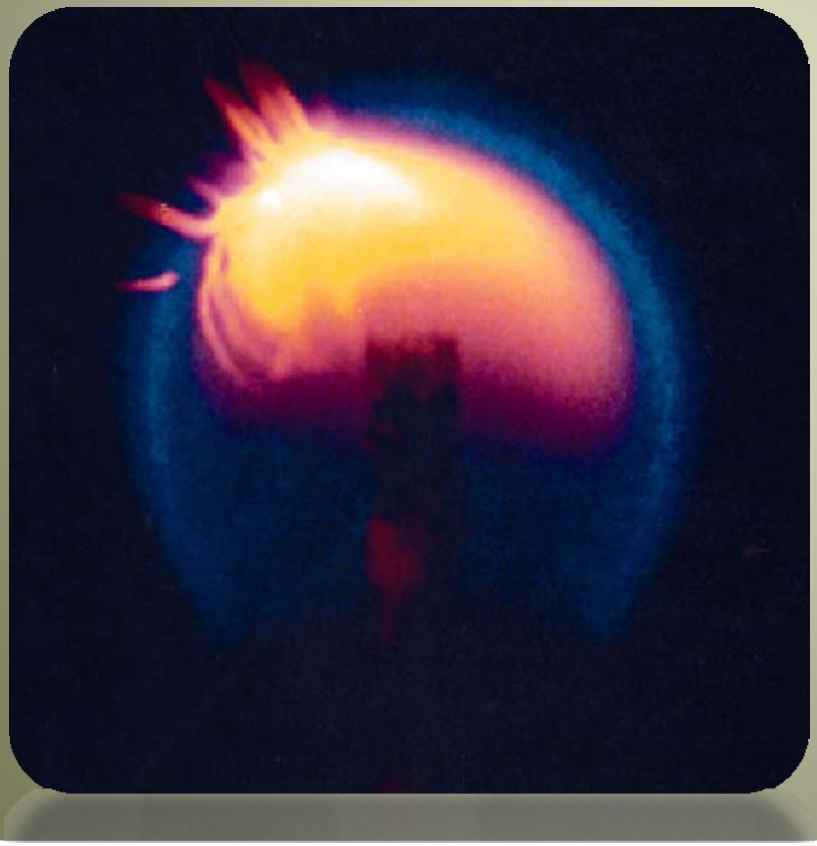
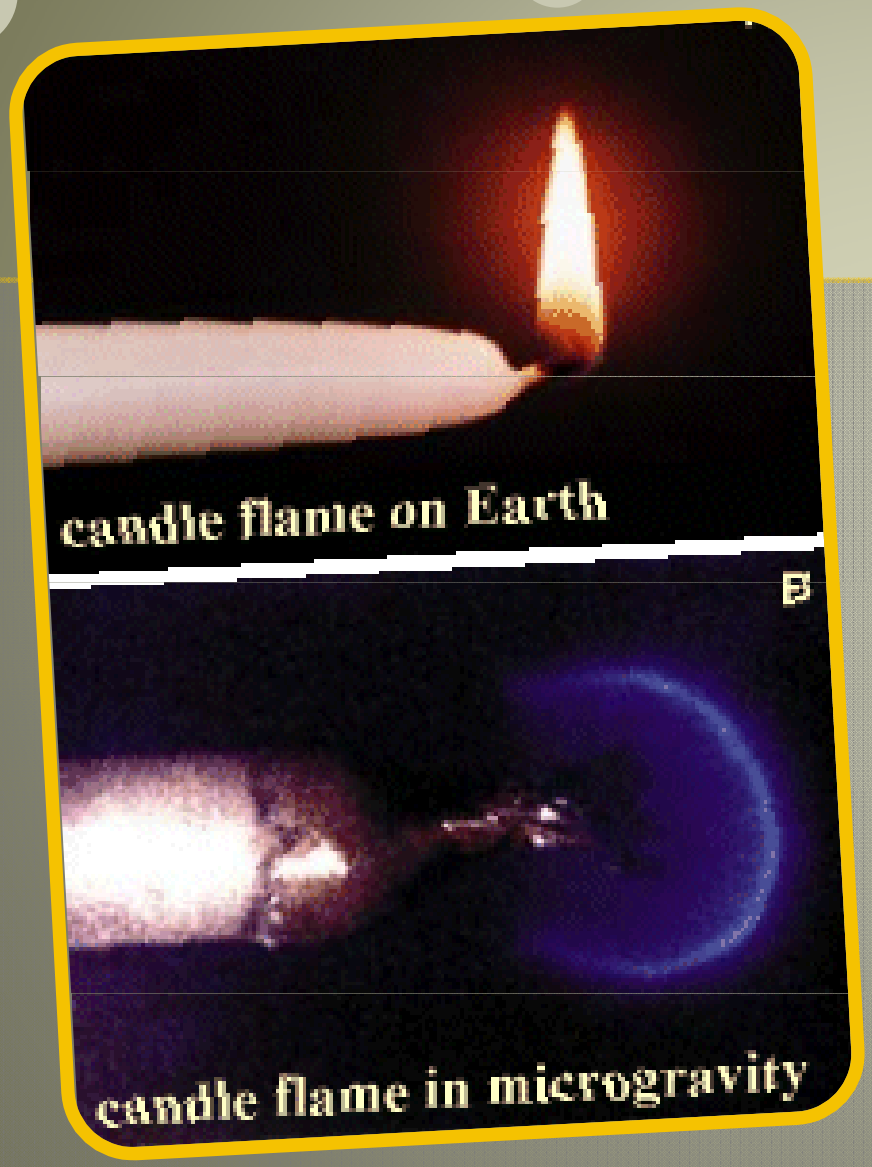
What is SLICE?

SLICE stands for Structure and Liftoff In Combustion Experiment and this experiment investigates microgravity's effect on flames

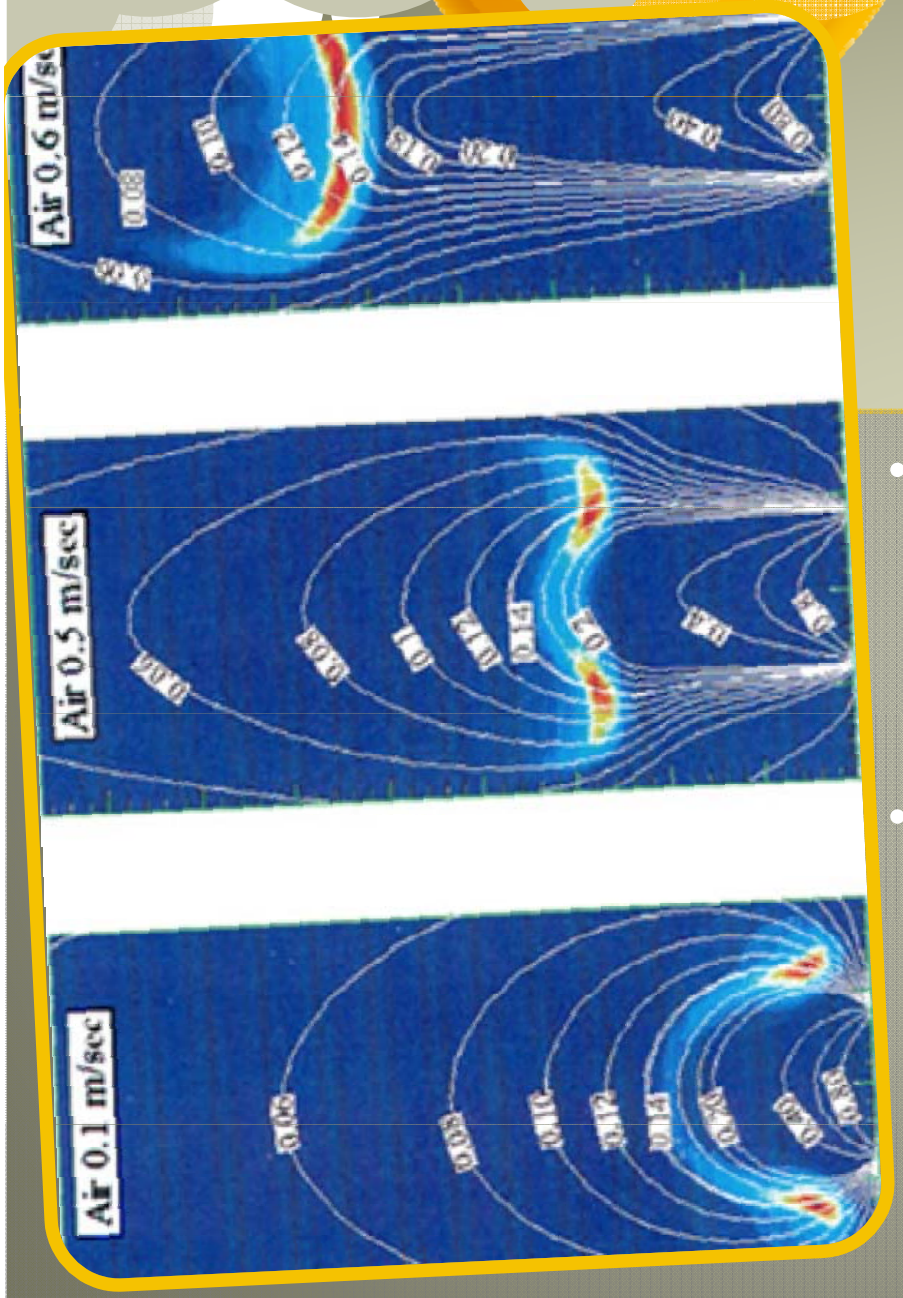


- The principal investigator in this experiment is Marshall B. Long of Yale University
- The co-investigators include Mitchell D. Smooke from Yale University, Fumiaki Takahashi from the National Center for Space Exploration Research, and Dennis P. Stocker from the Glenn Research Center



SLICING a Path!

- What's so important about researching flames in different environments? It's not going to do much right?
- Actually it's pretty important. The results from this experiment can help improve technologies in the combustion department which aim to eliminate pollution and increase burning efficiency in engines



Still SLICING

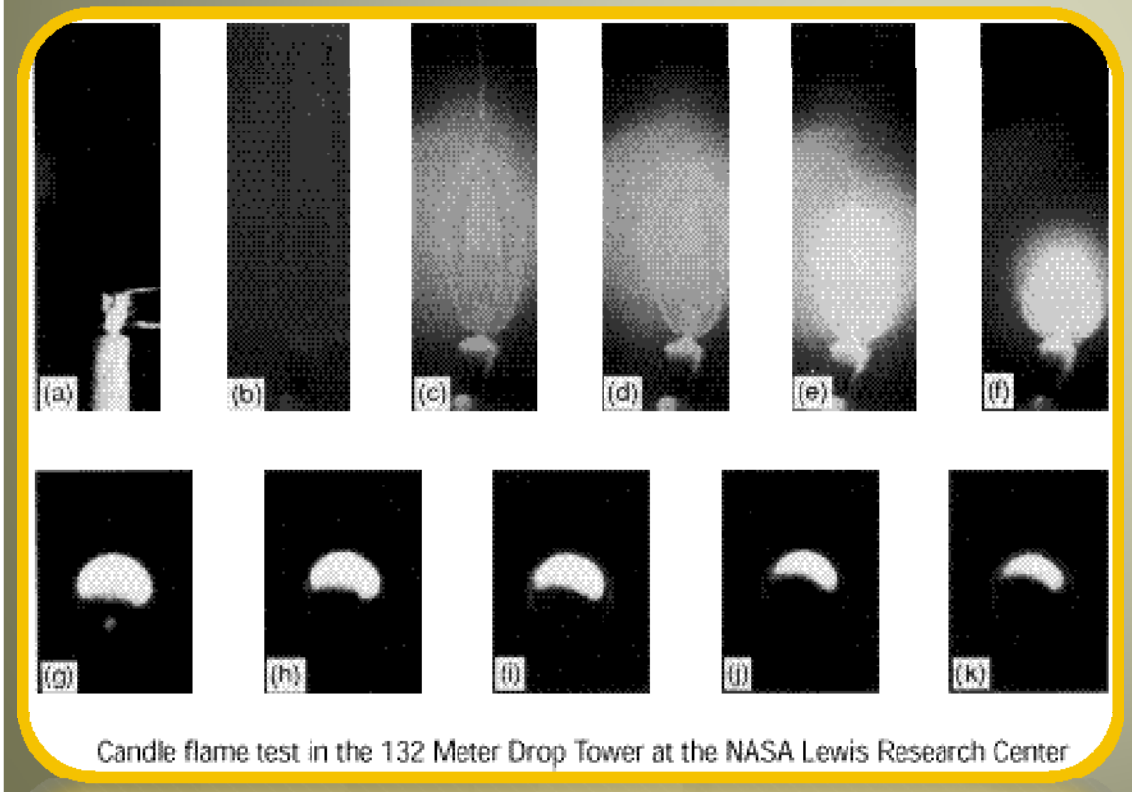
- Scientists are trying to characterize the structure of flames, especially at its base, in order to determine the function of the fuel they are burning, the burner diameter, and the flow conditions
- Scienctists also determine the flames lift off velocity which basically means the direction the flame flows due to outside influences and how the flame stabilizes itself after being affected

Well Sounds Like it's Ready Right?

- Not Quite! SLICE was first put into action during ISS Expeditions 29 and 30
- This experiment wasn't designed to have any space applications but it's findings may pave the way for improvements in combustion devices
- SLICE's applications on Earth include reduced time and cost in the development of common combustion devices such as engines and furnaces

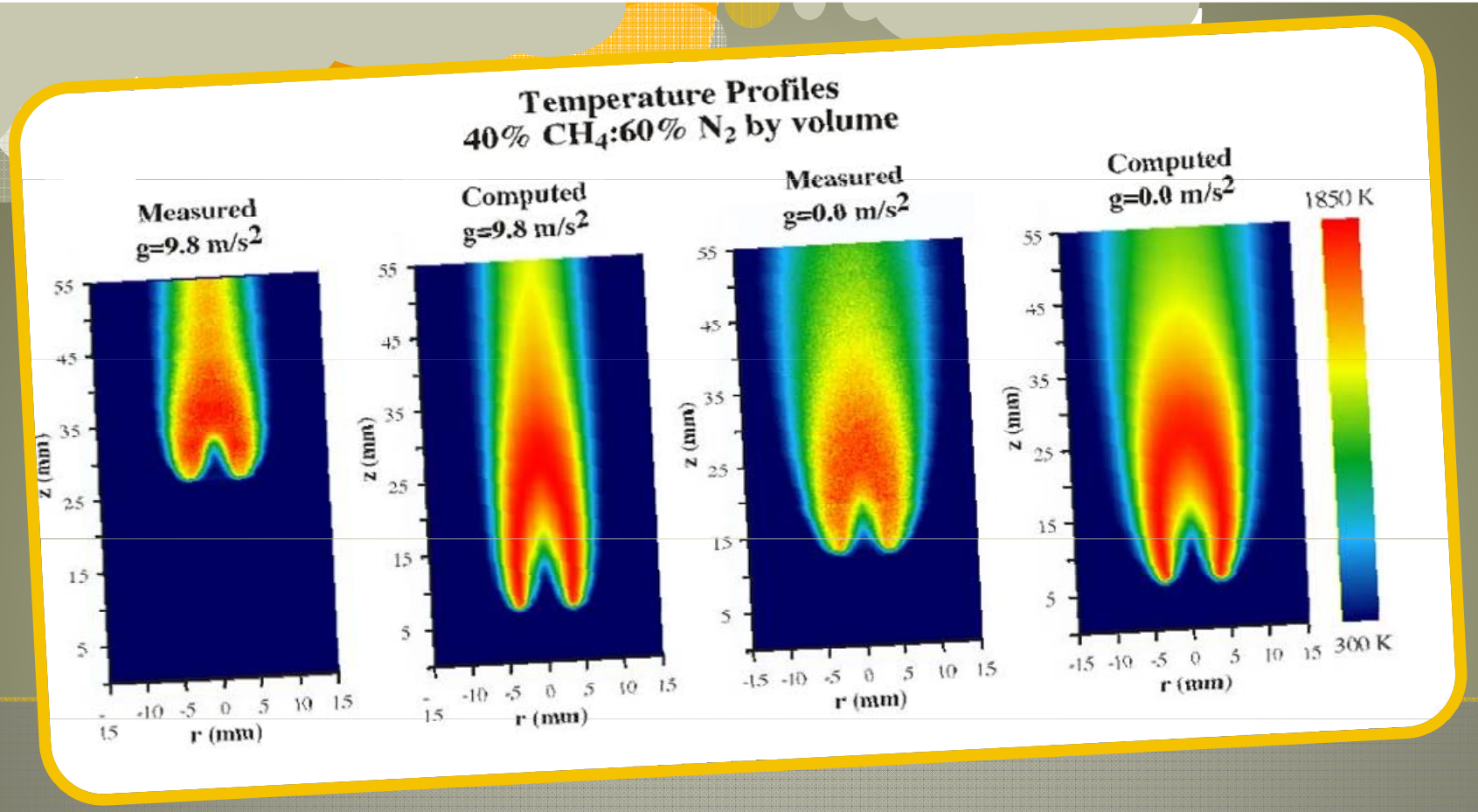
From concept to reality. The Procedure

- A flame is ignited in a low speed flow duct and photographed
- The fuel flow or air velocity is adjusted to understand its affect on flame structure and liftoff



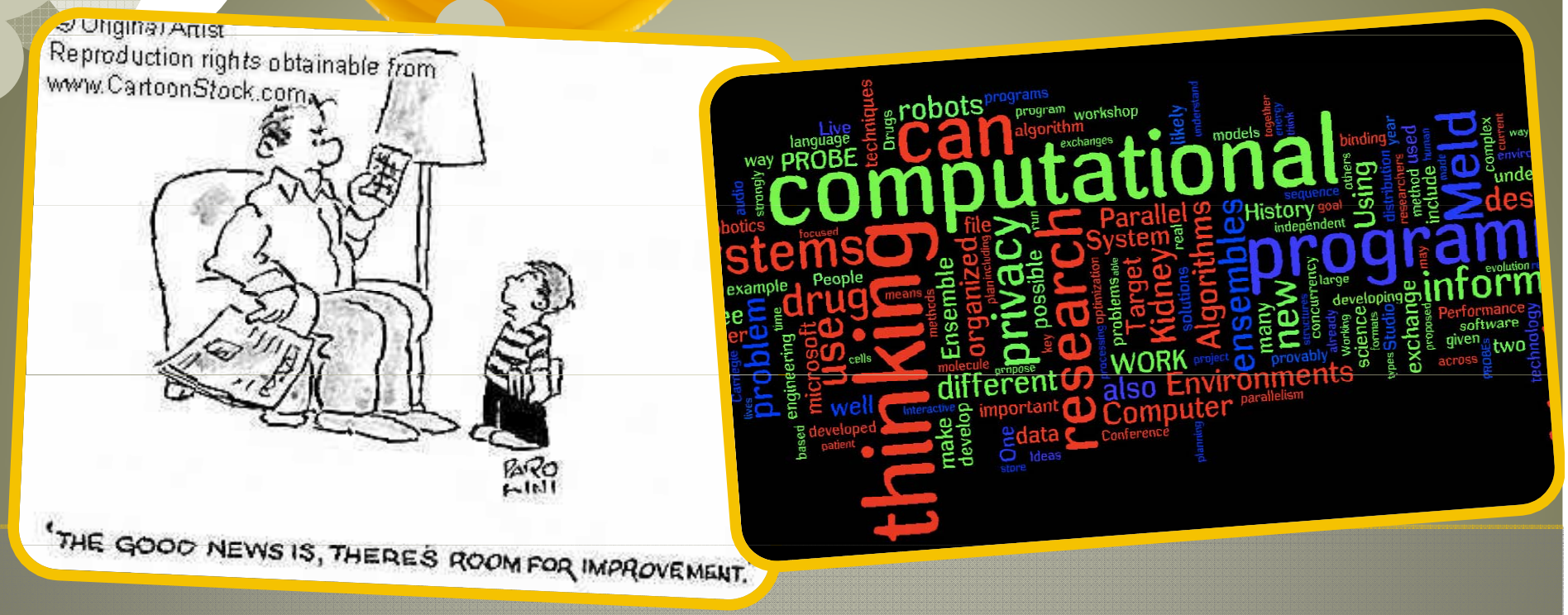
Candle flame test in the 132 Meter Drop Tower at the NASA Lewis Research Center

- Experimental parameters include the gaseous fuel and the diameter of the circular burner tube
- Flame measurements include the structure (ie. Size and shape), soot temperature, soot volume fraction, and thermal radiation



The Results of Hard Work

- At moderate flame conditions, the experimental and computation results are in agreement
- However, this agreement breaks down when there is high soot production and when the fuel is highly diluted



Well What Now?

- Now scientists are working on improving computational techniques in order to test a wider variety of flames in a broader range of conditions
- The future of advanced combustion technologies is underway and it won't be long until we get our first glimpse of what SLICE is capable of

That's All for Today

Thank you!